

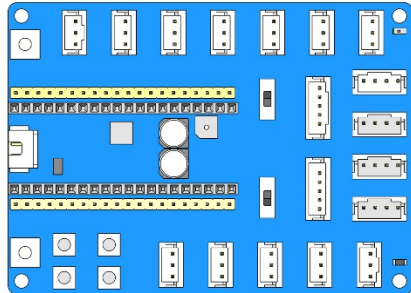


## Lesson 3 How to use the buzzer on the Pico Expansion board

The buzzer on the Pico Expansion board is an integrated electronic alarm device powered by DC power. It is widely used in the sound of computers, printers, copiers, alarms, electronic toys, vehicle electronic equipment, telephones, timers and other equipment.

### 3.1 Components & Parts

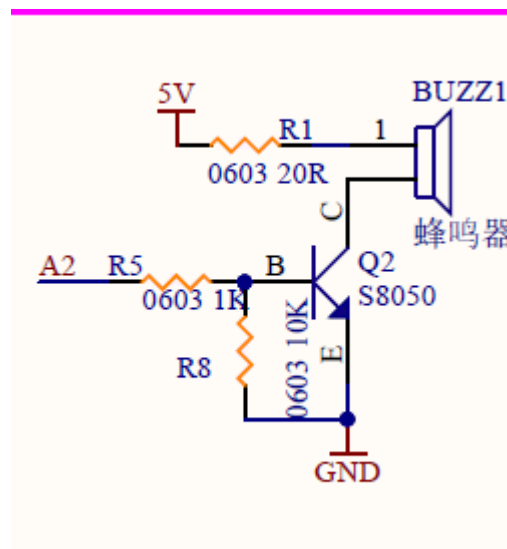
Components	Quantity	Picture
Raspberry Pi Pico	1	
USB cable	1	
Pico Expansion board	1	

### 3.2 Experimental Principle

Passive buzzers have no drive circuit. So the ideal signal for a passive buzzer is a square wave. Given a direct current, since the magnetic field does not change, it will not respond and the vibrating

plate cannot vibrate and produce sound. As long as some square wave signals of different frequencies are sent to the passive buzzer, the buzzer will emit different sounds accordingly.

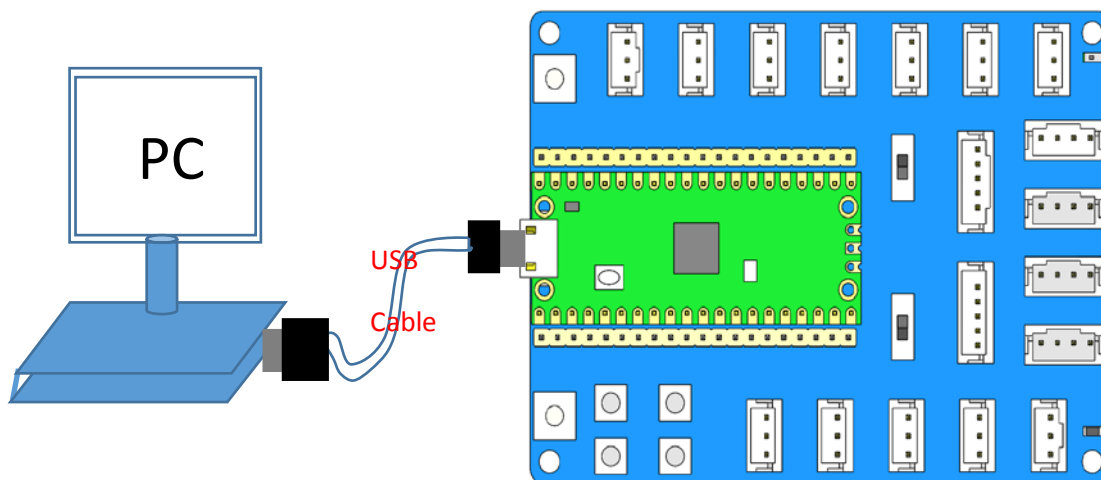
The schematic diagram:



This course controls the passive buzzer occupying the GPIO16 pin on the Pico Expansion board by programming the Raspberry Pi Pico.

### 3.3 Circuit

Please refer to the picture below to install the Pico on the expansion board. Note that the USB port of the Pico should be in the same direction as the power port of the Pico expansion board. After installation, connect the Pico to the computer via a USB cable.

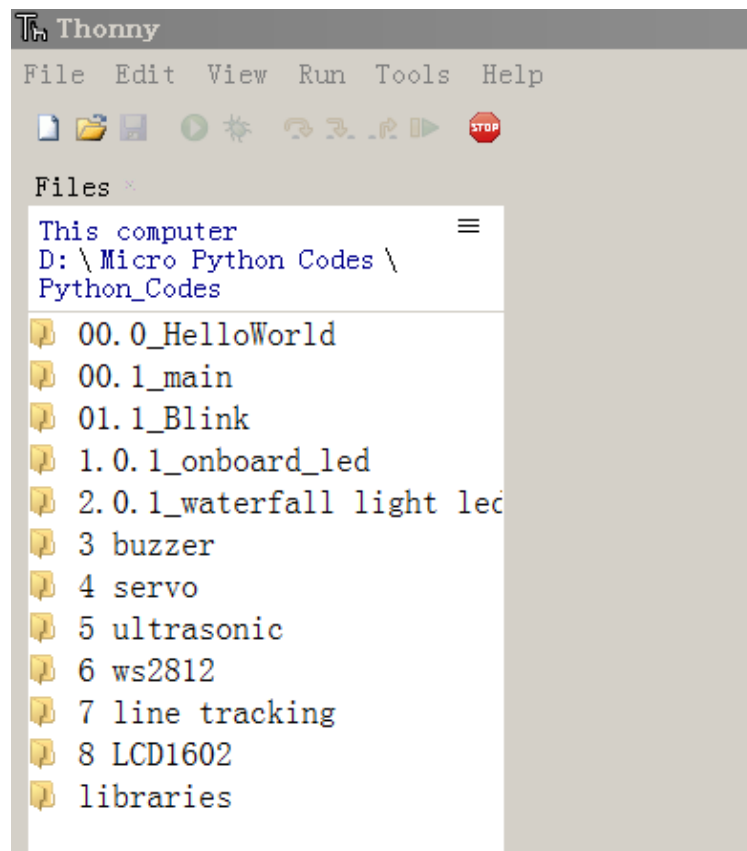


### 3.4 Run the program

3.4.1 Codes used in this tutorial are saved in "[Pico Expansion Kit Tutorial\Lessons for Python\Python\\_Codes](#)". You can move the codes to any location. For example, we save the codes in Disk(D) with the path of "[D:/ Micro Python codes](#)".

#### Buzzer

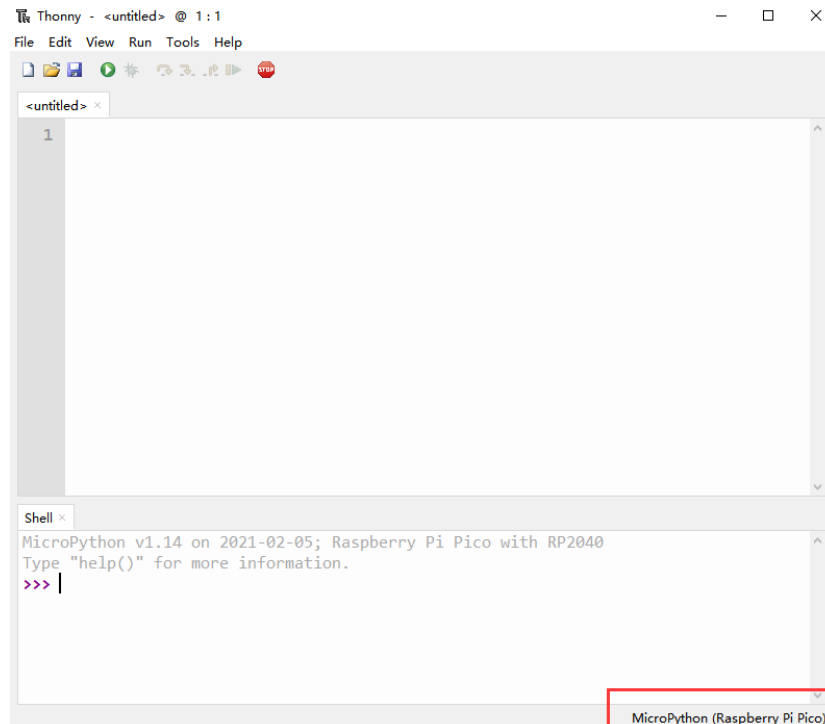
3.4.2 Open "Thonny", click "View"--"Files"--"This computer"--"D:"--"Micro Python Codes"--"Python\_Codes".



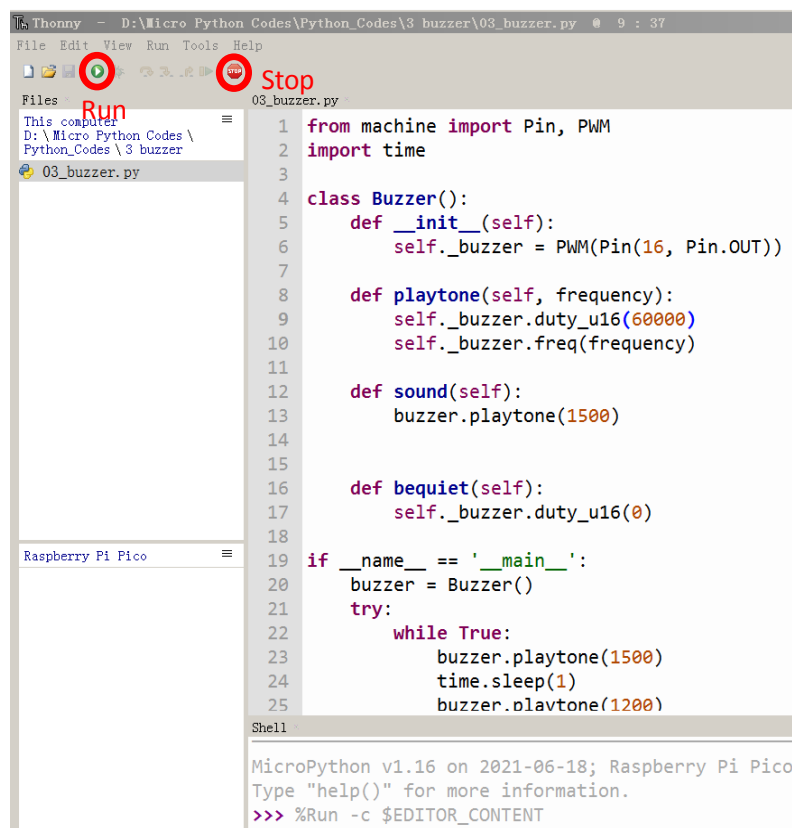
**This computer:** The file area of the personal computer.

**Raspberry pi Pico:** Pico file area, the code saved in Pico can be viewed in this area.

3.4.3 Confirm that "**MicroPython (Raspberry Pi Pico)**" is displayed in the lower right corner. If it is not, please click the font in the lower right corner to select "**MicroPython(Raspberry Pi Pico)**" mode.



3.4.4 Double-click the code "[03\\_buzzer.py](#)" required for this course. The content of the code will be displayed in the interface on the right.



3.4.5 Click the Run button to run the program, then the buzzer on the Pico Expansion board will be working, you can hear buzzing.

3.4.6 Click the stop button to stop the program, the buzzer will stop buzzing.

3.4.7 Also, you can upload the “03\_buzzer.py” and “main.py” to the Pico. Then you can run the program offline, disconnect the USB, and power on the Pico Expansion board, you will hear buzzing. Turn off the power, Pico HAT board and buzzer stop working.

## 3.5 Code

### 03\_buzzer.py

```
1. from machine import Pin, PWM
2. import time
3.
4. class Buzzer():
5.     def __init__(self):
6.         self._buzzer = PWM(Pin(16, Pin.OUT))
7.
8.     def playtone(self, frequency):
9.         self._buzzer.duty_u16(60000)
10.        self._buzzer.freq(frequency)
11.
12.    def sound(self):
13.        buzzer.playtone(1500)
14.
15.
16.    def bequiet(self):
17.        self._buzzer.duty_u16(0)
18.
19. if __name__ == '__main__':
20.     buzzer = Buzzer()
```

```
21.    try:
22.        while True:
23.            buzzer.playtone(1500)
24.            time.sleep(1)
25.            buzzer.playtone(1200)
26.            time.sleep(1)
27.    except KeyboardInterrupt:
28.        buzzer.bequiet()
```

### 3.6 What's Next?

THANK YOU for participating in this learning experience!

If you find errors, omissions or you have suggestions and/or questions about this Lesson, please feel free to contact us: [cokoino@outlook.com](mailto:cokoino@outlook.com)

We will make every effort to make changes and correct errors as soon as feasibly possible and publish a revised version.

If you want to learn more about Arduino, Raspberry Pi, Smart Cars, Robotics and other interesting products in science and technology, please continue to visit our website. We will continue to launch fun, cost-effective, innovative and exciting products.

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